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Lawrence M. Mennemeier
BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP
Seventh Floor
12400 Wilshire Boulevard
Los Angeles, CA 90025-1030

EXAMINER	
PARIHAR, SUCHIN	
ART UNIT	PAPER NUMBER
2825	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/666,619	YANG, JIN	
	Examiner	Art Unit	
	Suchin Parihar	2825	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 June 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6/1/2007 has been entered.

2. Applicant's arguments filed 6/1/2007 have been fully considered but they are not persuasive. The applicable rejections from the previous office action are incorporated herein.

Claim Rejections - 35 USC § 112

3 The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4 **Claims 6-10 are rejected under 35 U.S.C. 112, second paragraph**, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. With respect to claim 6, the phrase "implication structure" is not clearly described in the specification and not clearly defined in claim 6. Claims 7, 8, 9 and 10 depend from claim 6. Moreover, with respect to the most recent amendment to the specification, the amendment still fails to properly describe what is

implied or suggested by "implication structure". By definition, the term "implication" provides something implied or suggested, and the claims fail to point this out.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5 **Claims 1-5, 11 and 16 are rejected under 35 U.S.C. 102(b)** as being unpatentable over the Chiodo et al. (Chiodo) paper "Automatic Compositional Minimization in CTL Model Checking" (Nov, 1992), pages 172-178.

6 With respect to claim 1, Chiodo teaches: generate, from a first property, a first assumption (deduce by reasoning, pg 172, Introduction 1st paragraph) including a first state predicate (pg 172, 1 Introduction, 1st paragraph, i.e. to deduce properties by reasoning of the individual components and their interactions without ever building the composed system [assumption]); generate, for a model (model, pg 172, Introduction, 2nd paragraph), a first transition relation that includes the first state predicate (pg 173, 2.1 FSM Model, i.e. transition from present state to next state enabled by input i); and reduce the first transition relation according to the first assumption (pg 175, 3.2 Model Checking on a System of FSMs, i.e. reduced transition relation).

7 With respect to claim 2, Chiodo teaches all the elements of claim 1, from which the claim depends. Chiodo teaches: wherein reducing the first transition relation

reduces the size of the model (pg 172, Introduction 1, i.e. one tries to reduce the components in such a way that their composition yields a smaller model).

8 With respect to claim 3, Chiodo teaches all the elements of claim 1, from which the claim depends. Chiodo teaches: wherein reducing the first transition relation reduces the computational complexity of evaluating the first property (pg 173, Introduction, paragraphs 6 & 7, i.e. discussion of only preserving the behavior to verify the property, and reducing the size of the representation by removing irrelevant behavior).

9 With respect to claim 4, Chiodo teaches all the elements of claim 1, from which the claim depends. Chiodo teaches: wherein reducing the first transition relation reduces the number of variables in the model (pg 172, Introduction, paragraph 4, i.e. to produce component machines that have fewer states than the original ones).

10. With respect to claim 5, Chiodo teaches all the elements of claim 1, from which the claim depends. Chiodo teaches: wherein reducing the first transition relation reduces the number of variables in the first transition relation (pg 172, Introduction, paragraph 4, i.e. to produce component machines that have fewer states than the original ones).

11. With respect to claim 11, Chiodo teaches: means for producing, from a first property, a first assumption including a first state predicate (pg 172, Introduction 1, 1st paragraph, i.e. to deduce properties by reasoning of the individual components and their interactions [assumption]); and means for producing a reduced next state function from a first next state function involving the first state predicate by applying the first

assumption (pg 173, FSM Model 2.1, i.e. input to each component consists of present states [state predicate] and external inputs [assumption], and in this way, interacting FSM models [functions] produce a reduced transition relation).

12. With respect to claim 16, Chiodo teaches: a recordable medium to store executable instructions; a processing device to execute executable instructions (i.e. the term 'automatic" [see title] implies the use of a computer to produce the result(s) of the invention); and a plurality of executable instructions to cause the processing device to: produce, from a first property, a first assumption including a first state predicate (pg 172, Introduction 1, 1st paragraph, i.e. to deduce properties by reasoning of the individual components and their interactions [assumption]); produce, for a model, a first transition relation that includes the first state predicate (pg 173, 2.1 FSM Model, i.e. transition from present state to next state enabled by input i); and reduce the first transition relation according to the first assumption (pg 175, 3.2 Model Checking on a System of FSMs, i.e. reduced transition relation).

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

14. **Claims 6-10, 12-15 and 17-19 are rejected under 35 U.S.C. 103(a)** as being unpatentable over Chiodo et al. in view of Kurshan et al. (US 5,901,073).

15. With respect to claims 6, 12 and 17, Chiodo teaches all the elements of claims 1, 11 and 16, from which the claims depend respectively.

Chiodo fails to teach: wherein the first assumption is generated from an implication or logical structure of the first property.

However, Kurshan teaches: wherein the first assumption (see Figure 2, actual assumed values) is generated (see Figure 2, assumed values are generated as a result of assumable values) from an implication (see Figure 2, implied or assumable values) or logical structure (see Figure 2, structure, i.e. range of values) of the first property (see Figure 2, property, i.e. variables A and B).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate Kurshan into the invention of Chiodo for at least the following reason: Kurshan improves Chiodo by providing a method for reducing the computational resources required to formally verify a system design (see Kurshan, Abstract; also see Chiodo, Abstract, "reducing the complexity of a CTL model" and Kurshan Figure 3, 31 "reduce model").

16. With respect to claims 7 and 18, Chiodo in view of Kurshan teaches all the elements of claims 6 and 17, from which the claims depend respectively.

Kurshan teaches: propagate the first assumption (see Figure 2, assumed values for variable A) to generate a second assumption (see Figure 2, assumed values for variable B) according to a second property (see Figure 2, variable B is the second property).

17. With respect to claim 13, Chiodo in view of Kurshan teaches all the elements of claim 12, from which the claim depends respectively.

Kurshan teaches:

means for propagating the first assumption (see Figure 2, assumed values for variable A) according to a second property (see Figure 2, variable B is the second property) to generate a second assumption (see Figure 2, assumed values for variable B); and

means for producing, for a model, a transition relation (set of states and transitions that comprise the system model state machine, Col 1, lines 50-60) that includes the reduced next state function (next state functions, Col 2, lines 10-30).

18. With respect to claims 8, 14 and 19, Chiodo in view of Kurshan teaches all the elements of claims 7, 13 and 18, from which the claims depend respectively.

Kurshan teaches: wherein the second property is a sub-property of the first property (see Figure 2, property variable A and sub-property variable B).

19. With respect to claim 9, Chiodo in view of Kurshan teaches all the elements of claim 7, from which the claim depends.

Kurshan teaches: wherein the second property (see Figure 2, property/variables A or B) is to be evaluated (see Figure 2, actual assumed values are determined) under the first assumption (see Figure 2, range of assumable values).

20. With respect to claims 10 and 15, Chiodo in view of Kurshan teaches all the elements of claims 7 and 14, from which the claims depend respectively.

Kurshan teaches: wherein the first assumption is propagated only one transition stage to generate the second assumption (see Col 1, lines 55-65, set of states and transitions showing only one transition to a next state for each next state).

Response to Arguments

21. Applicant's arguments filed 6/1/2007 have been fully considered but they are not persuasive.

35 U.S.C. 102 Rejections

22. Applicant asserts that Chiodo et al. does not teach or disclose: generating or producing a first assumption from a first property including a first state predicate. Examiner disagrees with this assertion.

23. Examiner points out that Chiodo teaches: generating or producing (deducing properties, i.e. generating/producing a property, pg 172, Introduction, 2nd paragraph) a first assumption (deduce property by reasoning, i.e. assumption of the property) from a first property (deduce property by reasoning, pg 172, Introduction, 2nd paragraph) including a first state predicate ("p can be true at the next state of s", p is a predicate of state s, pg 173, 2nd column, last paragraph).

24. Applicant asserts that Chiodo et al. does not teach: producing a reduced next state function from a first next state function or reducing the first transition relation according to the first assumption. Examiner disagrees with this assertion.

25. Examiner points out that Chiodo teaches: producing a reduced (reduction of a state machine, pg 173, 1st column, 1st full paragraph) next state (next state, pg 173,

Background, 1st paragraph) function from a first next state function (each state must have next state, pg 173, Background, 1st paragraph) or reducing (reducing each component machine, see Abstract) the first transition relation (transition relation, pg 172, 2nd column, near end of 1st full paragraph) according to the first assumption (deduction of reasoned property, i.e. assumption, pg 172, 1st column, Introduction, 2nd paragraph).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Suchin Parihar whose telephone number is 571-272-6210. The examiner can normally be reached on Mon-Fri, 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Chiang can be reached on 571-272-7483. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO

Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Suchin Parihar
Examiner
AU 2825

PAUL DINH
PRIMARY EXAMINER